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Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-88HCB

8x8 Component /Video / Audio Matrix Switcher

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VS-88HCB** *8x8 Component / Video / Audio Matrix Switcher*, which is ideal for presentation and production applications. The package includes the following items:

- **VS-88HCB** *8x8 Component /Video / Audio Matrix Switcher*
- Power cord and Null-modem adapter
- Windows®-based Ethernet Configuration Manager and Virtual Serial Port Manager
- Windows®-based Kramer control software[2] and this user manual[3]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[4]

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Twisted-Pair Solutions; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Downloadable from our Web site at http://www.kramerelectronics.com

3 Download up-to-date Kramer user manuals from our Web site at http://www.kramerelectronics.com

4 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

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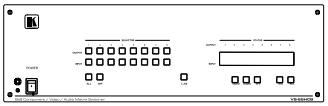
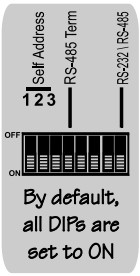
Step 1: Mount the machine - see section 5

Mount the machine in a rack or stick the 4 rubber feet to the underside

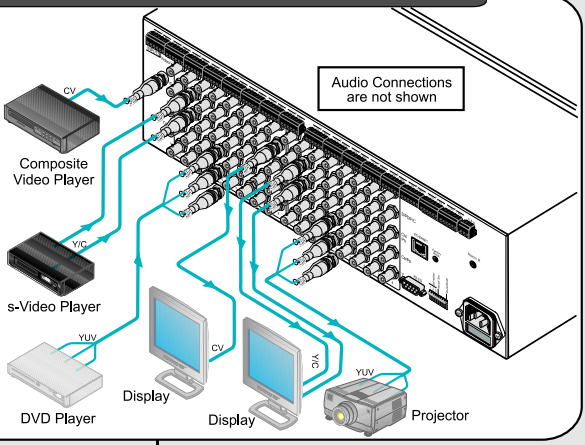


Step 2: Connect the inputs and outputs - see section 6

SET THE DIPSWITCHES



By default, all DIPs are set to ON

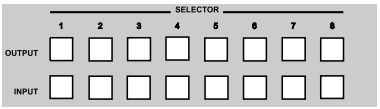


Step 3: Connect the control port - see section 6

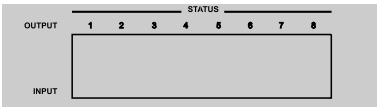
If required, connect an RS-232 optional Control Port, an RS-485 port and/or the ETHERNET

Step 4: Turn the power ON

Step 5: Set the machine - see section 7



Use the SELECTOR buttons to switch the inputs to the outputs



Read the STATUS on the 7-segment display

Connect a selected input to ALL the outputs

Disconnect an output

Press TAKE to confirm actions

VIDEO - Switching relates to the video signal
AUDIO - Switching relates to the audio signal
AFV - Audio follows video when switching

Store (STO) and recall (RCL) actions

Step 6: Operate the machine

Operate via the front panel buttons, IR remote control, RS-485, RS-232, and ETHERNET

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3 Overview

The high performance **VS-88HCB** is a universal matrix switcher for composite video, s-Video, component video (Y, Cb/Pb, and Cr/Pr), balanced stereo audio and S/PDIF digital audio signals. It can route any or all inputs to any or all outputs simultaneously. The **VS-88HCB** *8x8 Component /Video / Audio Matrix Switcher* features:

- High Bandwidth - 300MHz (-3dB) fully loaded
- HDTV compatibility
- Control via the front panel, RS-232 (K-Router™ Windows®-based software is included), RS-485, Ethernet, IR Remote **RC-IR2** (included) and external Remote IR receiver (optional), see section 4.1
- A Take button to execute multiple switches all at once
- Memory locations that can be used to store multiple switches as presets to be recalled and executed when needed
- Audio (analog) breakaway switching, for switching audio independently from video

The **VS-88HCB** is housed in a 19" 3U rack mountable enclosure.

In addition, the **VS-88HCB**:

- Can be used for mixed video applications such as CV, Y/C and YUV simultaneously
- Includes an ETHERNET connection that supports easy dial-up and Internet system remote control (requiring only a dedicated IP address[1] and a modem in the remote location) whether it is a stand-alone PC or a LAN[2] system

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise-levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your Kramer **VS-88HCB** away from moisture, excessive sunlight and dust

4 Your VS-88HCB

Figure 1 and Table 1 define the front and rear panels of the **VS-88HCB**.

1 IP Address is a 32-binary digit number that identifies each sender or receiver (within a network via a particular server or workstation) of data (HTML pages or e-mails) that is sent in packets across the Internet. Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit

2 LAN is Local Area Network

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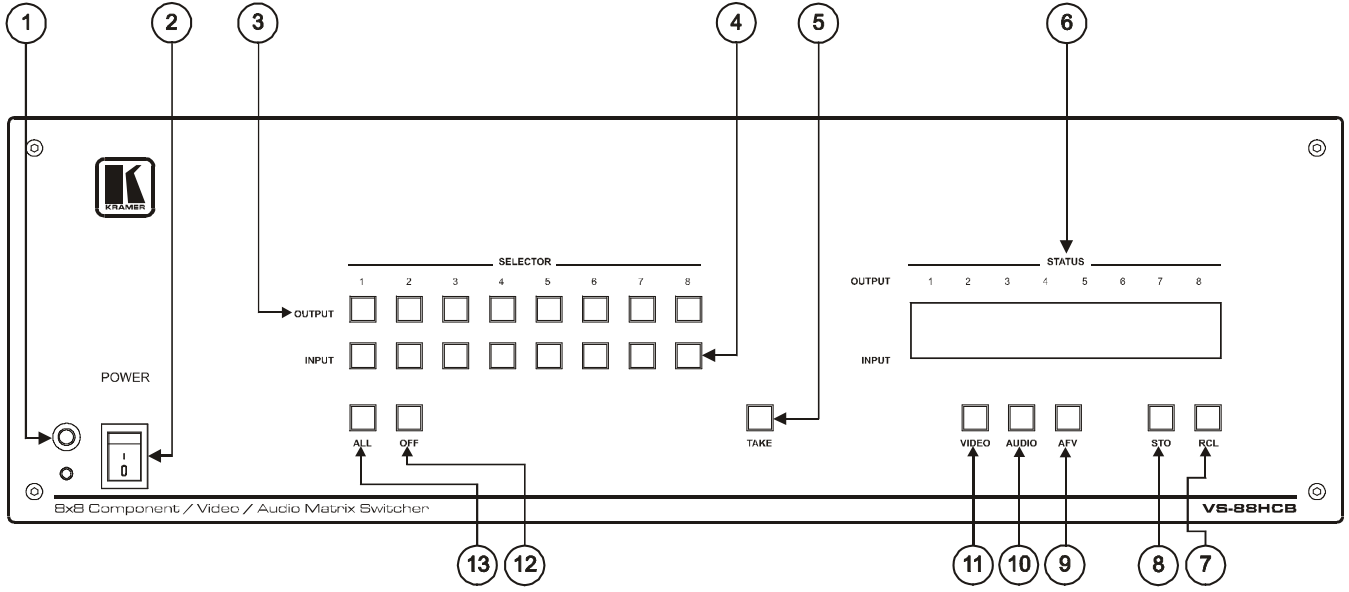

Figure 1: VS-88HCB 8x8 Component / Video / Audio Matrix Switcher Front Panel

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Table 1: VS-88HCB 8x8 Component / Video / Audio Matrix Switcher Front Panel Features

#	Feature	Function
1	IR Receiver	The red LED is illuminated when receiving signals from the Kramer Infrared remote control transmitter
2	*POWER* switch	Illuminated switch for turning the unit ON or OFF
3	*OUTPUT SELECTOR* Buttons	Select the output to which the input is switched (from 1 to 8)
4	*INPUT SELECTOR* Buttons	Select the input to switch to the output (from 1 to 8)
5	*TAKE*	Press to toggle between the Confirm mode[1] and the At Once mode (user confirmation per action is unnecessary), or press to confirm action
6	*INPUT STATUS* display	Displays the selected input switched to the output (marked above each input)
7	*RCL* Button	Press the RCL button followed by an INPUT button[2] to recall a setup from the non-volatile memory
8	*STO* Button	Press the STO button followed by an INPUT button[2] to store the current settings
9	*AFV* Button	When pressed[3], actions relate to the video and audio channels. The audio channels follow the video channels
10	*AUDIO* Button	When pressed[3], actions relate to audio
11	*VIDEO* Button	When pressed[3], actions relate to video
12	*OFF* Button	An OFF-OUTPUT combination disconnects that output from the inputs; an OFF-ALL combination disconnects all the outputs
13	*ALL* Button	Press ALL followed by an INPUT button to connect that input to all the outputs

1 When in the Confirm mode, the TAKE button blinks

2 In this case the INPUT button corresponds to the setup address number

3 The button illuminates

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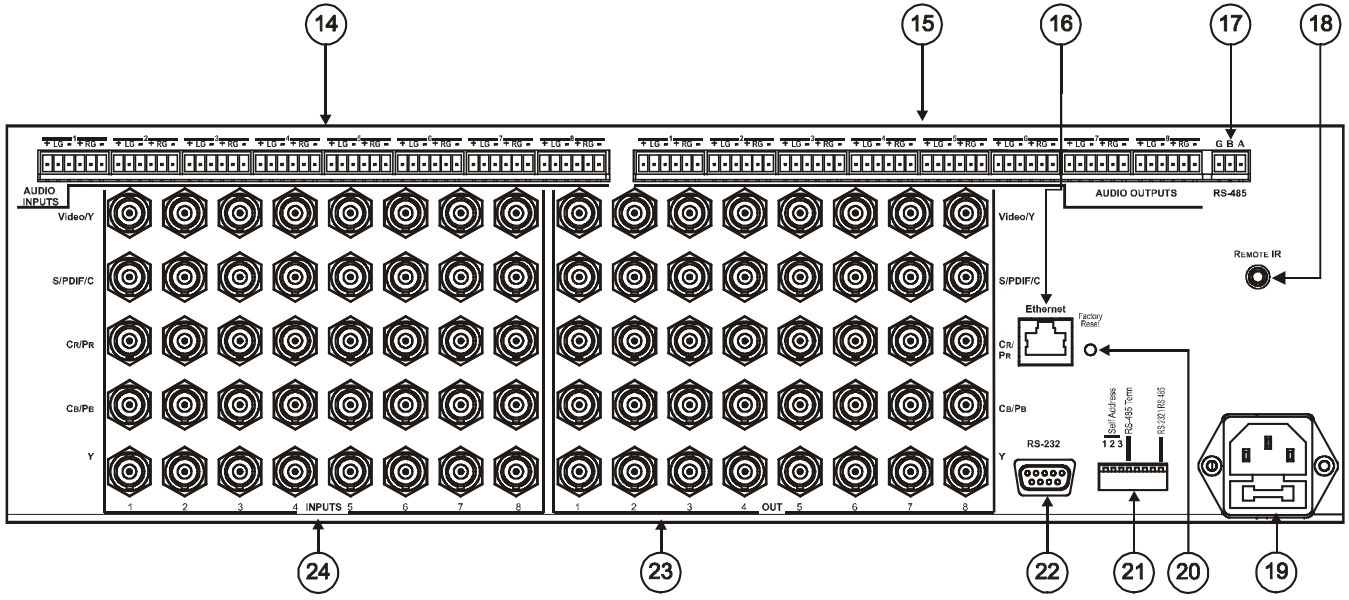

Figure 2: VS-88HCB 8x8 Component / Video / Audio Matrix Switcher Rear Panel

Table 2: VS-88HCB 8x8 Component / Video / Audio Matrix Switcher Rear Panel Features

#	Feature		Function
14	*AUDIO INPUTS* Terminal Block Connectors		Connect to the balanced stereo audio sources (from 1 to 8)
15	*AUDIO OUTPUTS* Terminal Block Connectors		Connect to the balanced stereo audio acceptors (from 1 to 8)
16	Ethernet Connector		Connects to the PC or other Serial Controller through computer networking
17	*RS-485* Port		Pin G is for the Ground connection[1]; pins B (-) and A (+) are for RS-485
18	*REMOTE IR* 3.5mm Mini Jack		Connect to an external IR receiver unit for controlling the machine via an IR remote controller (instead of using the front panel IR receiver)[2]
19	Power Connector with Fuse		AC connector, enabling power supply to the unit
20	*Factory Reset* Button		Press to reset to factory default definitions[3]: IP number – 192.168.1.39 Mask – 255.255.255.0 Gateway – 192.168.1.1
21	Dipswitches		Dipswitches for setup of the unit (1, 2 and 3 are for setting the machine number; 4 is for RS-485 bus termination; 5 is for Reply; 8 is for RS-485 PC communication)
22	*RS-232* 9-pin D-sub Port		Connect to the PC or the remote controller
23	*OUT* BNC Connectors (from 1 to 8)	Video/Y	Connect to the composite video (Video/Y) and digital audio (S/PDIF/C) acceptors, or to the s-Video (Video/Y and S/PDIF/C) acceptors
		S/PDIF/C	
		CR/PR	Connect to the component video (Y, CB/PB, CR/PR) acceptors
		CB/PB	
		Y	
24	*INPUT* BNC Connectors (from 1 to 8)	Video/Y	Connect to the composite video (Video/Y) and digital audio (S/PDIF/C) sources or to the s-Video (Video/Y and S/PDIF/C) sources
		S/PDIF/C	
		CR/PR	Connect to the component video (Y, CB/PB, CR/PR) sources
		CB/PB	
		Y	

1 The ground connection is sometimes connected to the shield of the RS-485 cable. In most applications, the ground is not connected

2 Can be used instead of the front panel (built-in) IR receiver to remotely control the machine

3 Turn the machine OFF, then turn the machine ON while pressing the FACTORY RESET button. The unit powers up and loads its memory with the factory default definitions

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4.1 Using the IR Transmitter

You can use the **RC-IR2** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an external IR receiver[1]. The external IR receiver can be located 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables[2].

Connect the external IR receiver to the REMOTE IR 3.5mm connector.

Control the **VS-88HCB** using the front panel buttons, or remotely via the Kramer **RC-IR2** Infrared Remote Control Transmitter, via an external remote IR receiver (optional), or via RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller.

1 P/N: C-A35M/IRR-50

2 P/N: C-A35M/A35F-50

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5 Installing in a Rack

This section describes what to do before installing in a rack and how to rack mount.

Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+5º to +45º C (41º to 113º F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20º to +70º C (-4º to 158º F)
Storage humidity range	5 to 95% RHL, non-condensing

CAUTION!!

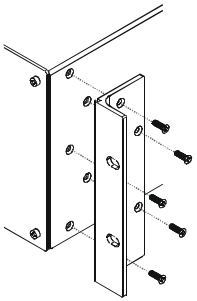
When installing in a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- **In some models, the front panel may feature built-in rack ears**
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: http://www.kramerelectronics.com)

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6 Connecting the VS-88HCB

To connect the **VS-88HCB**, as illustrated in the example in Figure 3, do the following[1]:

1. Connect the video sources[2]. For example, connect:
   - A composite video source (for example, a video player) to the Video/Y INPUT 1 BNC connector
   - An s-Video source (for example an s-Video player) to the Video/Y and S/PDIF/C INPUT 3 BNC connectors
   - A component video source (for example a DVD player) to the Y, CB/PB and CR/PR INPUT 5 BNC connectors
2. Connect up to eight[3] balanced stereo audio sources[4] to the AUDIO INPUT terminal block connectors.
3. Connect the video acceptors. For example, connect the:
   - Video/Y OUT 1 BNC connector to a composite video acceptor (for example, a composite video display)
   - Video/Y and S/PDIF/C OUT 3 BNC connectors to an s-Video acceptor (for example, an s-Video display)
   - Y, CB/PB and CR/PR OUT 5 BNC connectors to a component video acceptor (for example, a projector)
4. Connect the corresponding balanced stereo audio acceptors[4] to the AUDIO OUTPUTS terminal block connectors.
5. Set the dipswitches (see section 6.5).
6. Connect a PC and/or controller (if required) to the:
   - RS-232 port and/or
   - RS-485 port and/or
   - ETHERNET connector
7. Connect the power cord[4].

1 Switch off the power on each device before connecting it to your VS-88HCB. After connecting your VP-88HCB, switch on its power and then switch on the power on each device

2 All signal connections using more than one cable to interconnect between the devices, should be of equal length

3 Alternatively, you can connect digital S/PDIF audio (when connecting component and/or composite video)

4 Not illustrated in Figure 3

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Note that you can use the **VS-88HCB** for:

- Various video applications such as composite video, s-Video and component video on different inputs
- Parallel applications. For example, you can use it simultaneously as a composite video 8x8 matrix and a component video matrix
- Mixed applications (such as composite video and component video simultaneously). When doing so, select the parallel output channels for the same format. For example, if the Video/Y Channel is used for composite video then the output channel (Video/Y)[1] should be used similarly

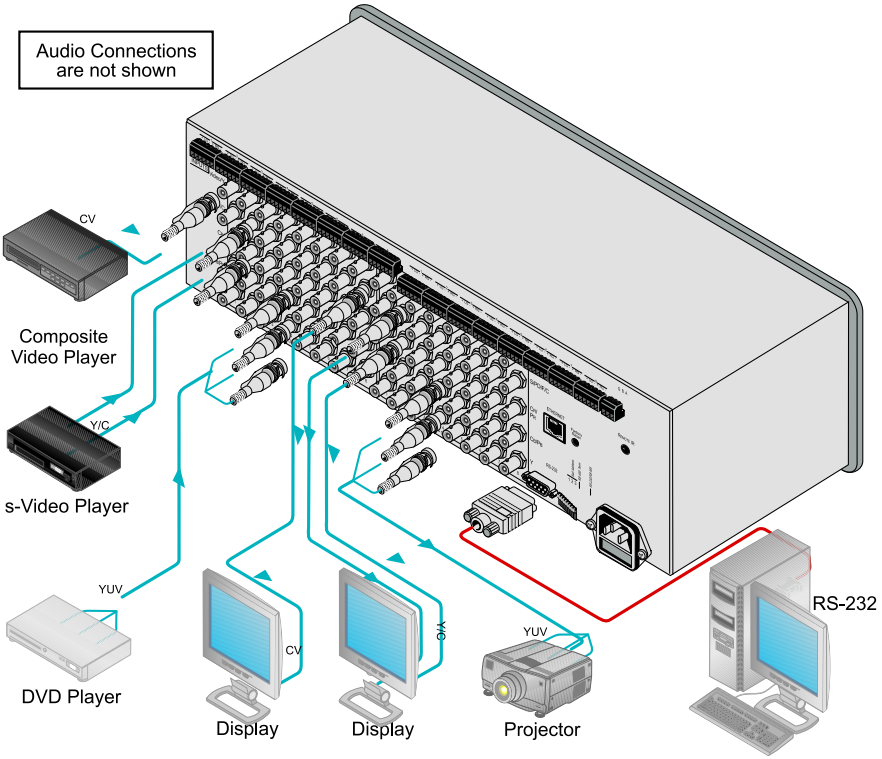

Figure 3: Connecting the VS-88HCB 8x8 Component / Video / Audio Matrix Switcher

1 In a mixed signal application all the input channels are selected simultaneously. For example, if used for CV and component video parallel switching, then when input number 1 is selected, it selects both input number 1 of the CV and input number 1 of the component video channels

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6.1 Connecting the Balanced/Unbalanced Stereo Audio Input/Output

This section illustrates how to wire:

- A balanced input/output connection (see Figure 4)
- An unbalanced audio output (see Figure 5)
- An unbalanced source to the balanced input on the **VS-88HCB** (see Figure 6)

Figure 4 illustrates how to wire a balanced input/output connection:

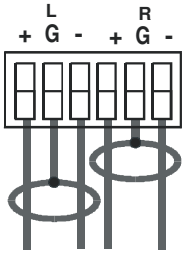

Figure 4: Connecting the Balanced Stereo Audio Input/Output

Figure 5 illustrates how to wire an unbalanced acceptor to the balanced output of the unit:

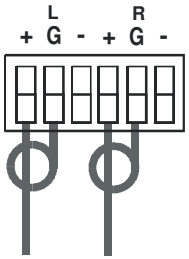

Figure 5: Connecting the Unbalanced Stereo Audio Output

Figure 6 illustrates how to connect an unbalanced source to the balanced input on the **VS-88HCB**:

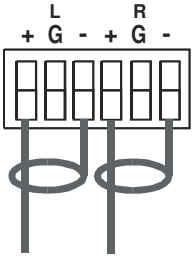

Figure 6: Connecting an Unbalanced Source to the Balanced Input

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6.2 Controlling via RS-232 (for example, using a PC)

To connect a PC to the **VS-88HCB** unit[1], using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 9-pin D-sub rear panel port on the **VS-88HCB** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable[2] to the RS-232 9-pin D-sub port on your PC

To connect a PC to the **VS-88HCB** unit[1], without using a Null-modem adapter:

- Connect the RS-232 9-pin D-sub port on your PC to the RS-232 9-pin D-sub rear panel port on the **VS-88HCB** unit, as Figure 7 illustrates[2]

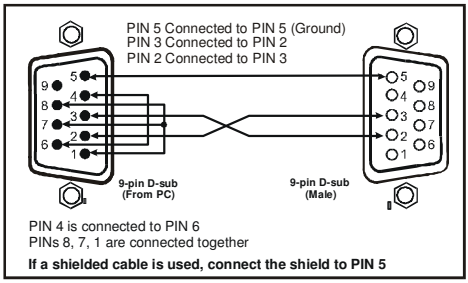
PIN 5 Connected to PIN 5 (Ground)
PIN 3 Connected to PIN 2
PIN 2 Connected to PIN 3
9-pin D-sub (From PC)
9-pin D-sub (Male)
PIN 4 is connected to PIN 6
PINs 8, 7, 1 are connected together
If a shielded cable is used, connect the shield to PIN 5

Figure 7: Connecting a PC without using a Null-modem Adapter

1 When connecting a single VS-88HCB unit via RS-232, set the SELF ADDRESS # dipswitches to SELF ADDRESS # 1, according to Table 4

2 Up to 50 feet of cabling may be used for the RS-232 connection

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6.3 Controlling via RS-485

You can control a **VS-88HCB** unit via an RS-485 controller[1], for example, a PC (equipped with an RS-485 interface) or a Master Programmable Remote Control system, such as the Kramer **RC-3000**.

To connect an **RC-3000** to a single **VS-88HCB** unit (see Figure 8):

1. Connect the RS-485 terminal block port on the **RC-3000** to the RS-485 port on the **VS-88HCB** unit, as follows:
   - Connect the "A" (+) PIN on the RS-485 rear panel port of the **RC-3000** to the "A" (+) PIN on the RS-485 rear panel port of the **VS-88HCB** unit
   - Connect the "B" (-) PIN on the RS-485 rear panel port of the **RC-3000** to the "B" (-) PIN on the RS-485 rear panel port of the **VS-88HCB** unit
   - If shielded twisted pair cable is used, the shield may be connected to the "G" (Ground) PIN on one of the units (for example, on the **RC-3000**)
2. Set the SELF ADDRESS # dipswitches on the **VS-88HCB** unit to a SELF ADDRESS # between 2 and 8, according to section 6.5.1. Do not set as SELF ADDRESS # 1 (the Master). Terminate the RS-485 line on both the **VS-88HCB** unit (set DIP 4 to ON) and on the **RC-3000**[2].

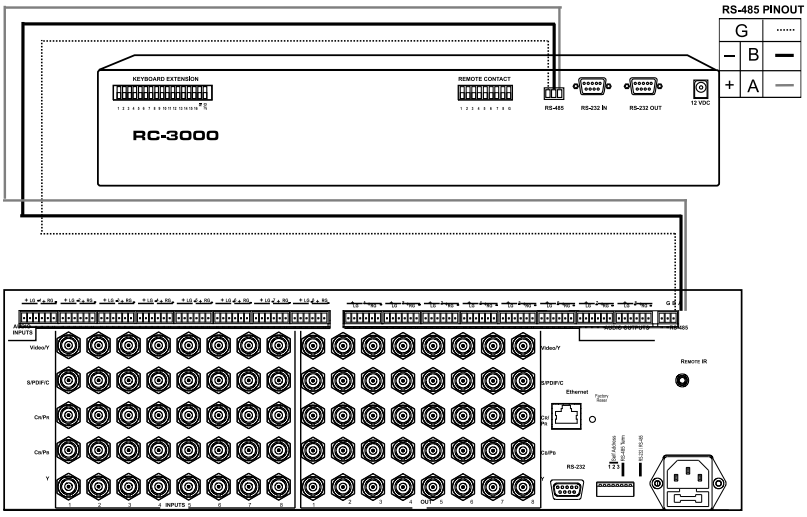

Figure 8: Controlling via RS-485 (for example, using an RC-3000)

1 RS-485 can be used for control even for distances exceeding 1km

2 Refer to the RC-3000 user manual for details of how to terminate the RS-485 line

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6.4 Controlling the VS-88HCB via the Ethernet Port

You can connect the **VS-88HCB** via the ETHERNET in the following ways:

- For direct connection to the PC, use a crossover cable (see section 6.4.1)
- For connection via a network hub or network router, use a straight-through cable (see section 6.4.2)

6.4.1 Connecting the ETHERNET Port directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **VS-88HCB** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identification of the factory default IP Address of the **VS-88HCB** during the initial configuration

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
   The Local Area Connection Properties window appears.
5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button (see Figure 9).

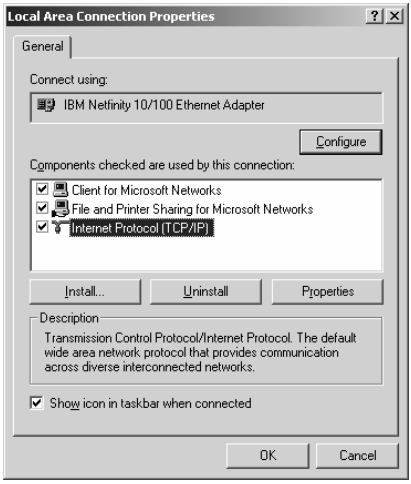

Figure 9: Local Area Connection Properties Window

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6. Select Use the following IP address, and fill in the details as shown in Figure 10.
7. Click **OK**.

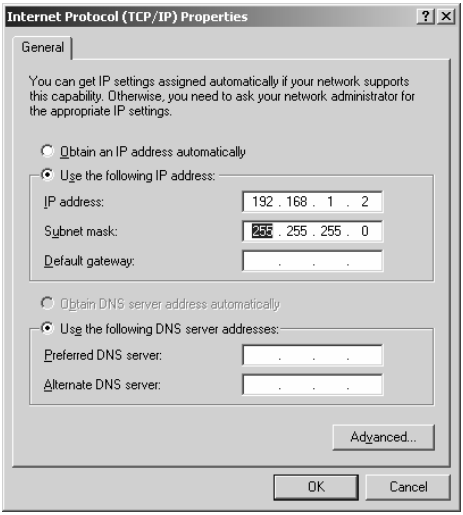
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 1 . 2
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 10: Internet Protocol (TCP/IP) Properties Window

6.4.2 Connecting via a Straight-Through Cable

You can connect the ETHERNET of the **VS-88HCB** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

6.4.3 Configuring the Ethernet Port

After connecting the Ethernet port, you have to install and configure it. For detailed instructions on how to install and configure your Ethernet port, see the “Ethernet Configuration (FC-11) guide.pdf” on our Web site: http://www.kramerelectronics.com

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6.5 Setting the VS-88HCB Dipswitches

This section describes the machine set-up and dipswitch selection.

Figure 11 illustrates the factory default dipswitches and Table 3 describes them.

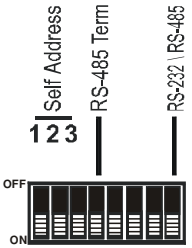

Figure 11: VS-88HCB Dipswitches

Table 3: Dipswitch Settings

DIPS	Function	Description
1, 2, 3	Self Address	Determines the position of the machine in the input expansion configuration (in the factory default, these DIPs are set to ON)
4	RS-485 TERM	ON for RS-485 Line Termination (factory default) OFF for no RS-485 Line Termination
5	Reply	ON enables reply from switcher to PC (factory default) OFF disables reply from switcher to PC
6, 7	RESERVED	Set to ON (factory default)
8	RS-232 \ RS-485	ON enables RS-232 communication between switcher and PC (factory default) OFF disables reply from switcher to PC

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6.5.1 Setting the SELF ADDRESS Dipswitches

The SELF ADDRESS determines the position of a **VS-88HCB** unit in the sequence, specifying which **VS-88HCB** unit is being controlled when several **VS-88HCB** units are controlled by a PC or serial controller. Set the SELF ADDRESS on a **VS-88HCB** unit via DIPS 1, 2, and 3, according to Table 4.

- When using a stand-alone **VS-88HCB** unit, set the SELF ADDRESS to 1
- When connecting more than one **VS-88HCB** unit, set the first machine (the Master) connected via RS-232, as SELF ADDRESS # 1. The Master connects to the PC via the RS-232 port. The other **VS-88HCB** slave units (each set to a SELF ADDRESS # between 2 and 8) interconnect via their RS-485 ports to the RS-485 port on the Master

Table 4: MACHINE # Dipswitch Settings

MACHINE #	DIPS		
	1	2	3
1 Master	ON	ON	ON
2	OFF	ON	ON
3	ON	OFF	ON
4	OFF	OFF	ON
5	ON	ON	OFF
6	OFF	ON	OFF
7	ON	OFF	OFF
8	OFF	OFF	OFF

6.5.2 Setting the Reply Dipswitch

Dipswitch #5 (the Reply dipswitch) enables or disables a reply from the **VS-88HCB** to the PC.

This is desirable, so that the controlling device “knows” that the controlled device has carried out its instructions. When an RS-485 connection is used for communication between the Matrix Switcher and the PC, dipswitch #8 should be set to OFF. In some applications, it may be desirable for some machines not to reply to instructions received on the RS-232 and RS-485 ports. In this case, the **Reply**, or acknowledgement commands should be disabled.

6.5.3 Setting the RS-232/RS-485 Dipswitch

The RS-232/RS-485 dipswitch allows you to enable RS-232 communication between the Matrix Switcher and the PC.

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7 Operating Your VS-88HCB

Operate your **VS-88HCB** via:

- The front panel buttons
- RS-232/RS-485 serial commands transmitted by a touch screen system, PC, or other serial controller
- ETHERNET
- The Kramer **RC-IR2** Infrared Remote Control Transmitter

7.1 Displaying the Unit Characteristics

The **VS-88HCB** 7-segment Display[1] shows the selected audio[2] or video[3] input switched to the marked output.

The unit's characteristics[4] are displayed in the following circumstances:

- Immediately (and automatically) after switching on the power; and
- When simultaneously pressing and holding for 3 seconds the INPUT buttons: 1, 2 and 3 (see section 7.6)

7.2 Selecting and Connecting an Output and/or Input

To switch an input to an output, press the desired OUTPUT button, followed by the desired INPUT button.

In addition, to:

- Disconnect a video/audio Input from a specific output, press the desired OUTPUT button followed by the OFF button. To disconnect all the outputs, press the ALL button, followed by the OFF button
- Connect a video/audio input to all outputs, press the ALL button followed by the INPUT button corresponding to the input that is to be routed to all the outputs

1 Item 6 in Table 1

2 When the Audio button illuminates, that is, when the audio breakaway mode is selected

3 When the Video button illuminates, that is, when the video breakaway mode is selected

4 Machine model and software version

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7.3 Choosing the Audio-Follow-Video or Breakaway Option

You can switch stereo audio signals in one of two ways, either:

- Audio-follow-video (AFV), in which all operations relate to both the video and the audio channels; or
- Breakaway, in which video and audio channels switch independently

7.3.1 Setting the Audio-Follow-Video Option

To set the Audio-follow-video (AFV) option press the AFV button:

- If the AUDIO and VIDEO configurations are the same, then the AFV button illuminates. The audio will follow the video
- If the AUDIO differs from the VIDEO, then the TAKE and the AUDIO buttons will flash. Also, the audio outputs in the STATUS 7-segment display, which will be changed, will flash[1]. Press the TAKE button to confirm the modification. The audio will follow the video

7.3.2 Setting the Breakaway Option

To set the Breakaway option:

Press either the AUDIO (for audio control only) or the VIDEO (for video control only) button:

- If the AUDIO button illuminates, switching operations relate to Audio
- If the VIDEO button illuminates, switching operations relate to Video

The STATUS window displays audio or video settings, according to your selection.

7.4 Confirming Settings

You can choose to work in the At Once or the Confirm mode. When the **VS-88HCB** operates in the At Once mode, pressing an OUTPUT-INPUT combination implements the switch immediately. In the Confirm mode, the TAKE button must be pressed to authorize the switch.

The At Once Mode

In the At Once mode, you save time as execution is immediate and actions require no user confirmation. However, no protection is offered against changing an action in error.

1 Warning that you are about to modify the audio configuration for AFV operation

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The Confirm Mode

In the Confirm mode:

- You can key-in several actions and then confirm them by pressing the TAKE button, to simultaneously activate the multiple switches
- Every action requires user confirmation, to protect against erroneous switching
- Execution is delayed[1] until the user confirms the action

7.4.1 Toggling between the At Once and Confirm Modes

To toggle between the At Once and Confirm modes, do the following:

1. Press the TAKE button to toggle from the At Once mode[2] to the Confirm mode[3].
   Actions now require user confirmation and the TAKE button illuminates.
2. Press the illuminated TAKE button to toggle from the Confirm mode back to the At Once mode.
   Actions no longer require user confirmation and the TAKE button no longer illuminates.

7.4.2 Confirming a Switching Action

To confirm a switching action (in the Confirm mode), do the following:

1. Press an OUTPUT-INPUT combination.
   The corresponding input number that is displayed in the STATUS 7-segment Display blinks. The TAKE button also blinks.
2. Press the blinking TAKE button to confirm the action.
   The corresponding input number that is displayed in the STATUS 7-segment Display no longer blinks. The TAKE button illuminates.

To confirm several actions (in the Confirm mode), do the following:

1. Press each OUTPUT-INPUT combination in sequence.
   The corresponding input numbers that are displayed in the STATUS 7-segment Display blink. The TAKE button also blinks.
2. Press the blinking TAKE button to confirm all the actions.
   The corresponding input numbers that are displayed in the STATUS 7-segment Display no longer blink. The TAKE button illuminates.

1 Failure to press the TAKE button within one minute (the Timeout) will abort the action

2 The TAKE button does not illuminate

3 The TAKE button illuminates

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7.5 Storing/Recalling Input/Output Configurations

You can store and recall up to 8 input/output configurations (or setups) in non-volatile memory, using the INPUT SELECTOR buttons 1 to 8.

7.5.1 Storing an Input/Output Configuration

To store the current status in memory, do the following:

1. Press the STO button.
   The STO button blinks.
2. Press one of the INPUT SELECTOR buttons from 1 to 8. This will be the setup # in which the current status is stored.
   The memory stores the data at that reference.

7.5.2 Recalling an Input/Output Configuration

To recall an input/output configuration, do the following:

1. Press the RCL button.
   The RCL button blinks.
2. Press the appropriate INPUT SELECTOR button (the INPUT SELECTOR button # corresponding to the setup #). The memory recalls the stored data from that reference.

7.5.3 Deleting an Input/Output Configuration

To delete an input/output configuration, do the following:

1. Press the STO and RCL buttons simultaneously.
   Both the STO and RCL buttons blink.
2. Press the appropriate INPUT SELECTOR button.
   This erases that specific input/output configuration from the memory, leaving it empty and available[1].

7.6 Resetting the Machine

To reset the machine, press INPUT buttons 1, 2 and 3 simultaneously. The machine resets itself and a 7-segment self-test is automatically performed.

1 Storing a new configuration over a previous configuration (without deleting it first) replaces the previous configuration

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8 Controlling Several VS-88HCB Units

You can connect up to eight single **VS-88HCB** units with control from a PC or serial controller via RS-232 and RS-485, or up to seven single units via RS-485.

8.1 Control Configuration via RS-232 and RS-485

To control up to eight **VS-88HCB** units – with control from a PC or serial controller – via RS-232 and RS-485, as Figure 12 illustrates, do the following:

1. Connect the video sources and acceptors, the appropriate audio sources and acceptors, and the power cord to each **VS-88HCB** unit.
2. On each **VS-88HCB**, set the SELF ADDRESS # as required[1]
3. Connect the RS-232 port on the first **VS-88HCB** unit to the PC using the Null-modem adapter provided with the machine (see section 6.2).
4. Interconnect the RS-485 ports on all the **VS-88HCB** units: from the RS-485 port on the first **VS-88HCB** unit, to the RS-485 port on the second **VS-88HCB** unit, and so on – up to the RS-485 port on the eighth **VS-88HCB** unit.

1 Set the first unit to SELF ADDRESS # 1 (Master), the second unit to SELF ADDRESS # 2, and so on - up to SELF ADDRESS # 8 for the eighth unit

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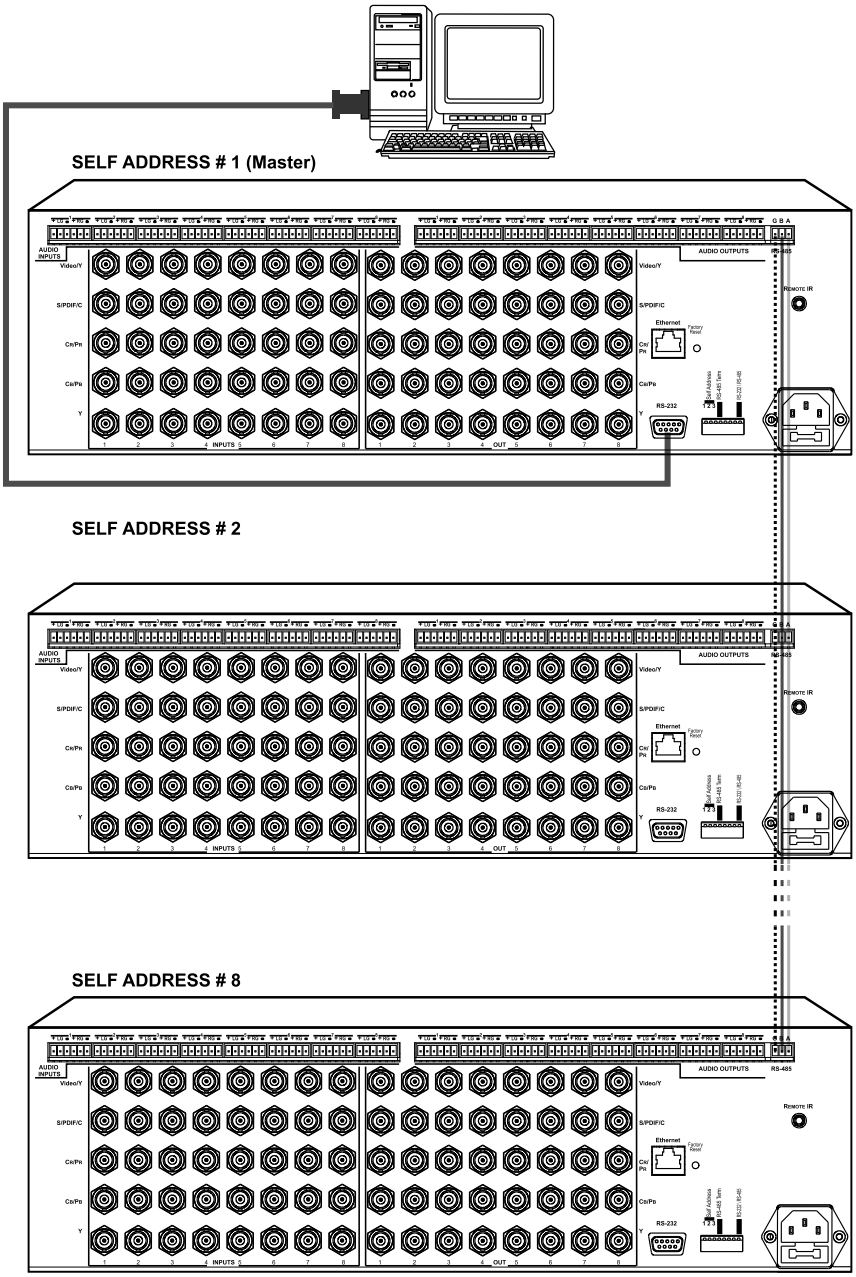

Figure 12: Control Configuration via RS-232 and RS-485

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8.2 Control Configuration via RS-485

To control up to seven single **VS-88HCB** units via an RS-485 controller, for example, a Master Programmable Remote Control system, such as the Kramer **RC-3000**, or a PC (equipped with an RS-485 interface), as Figure 13 illustrates, do the following[1]:

1. Connect the video sources and acceptors, the appropriate audio sources and acceptors, and the power cord to each **VS-88HCB** unit.
2. On each **VS-88HCB** unit, set the SELF ADDRESS # dipswitches, as required. For example, set the first **VS-88HCB** unit to SELF ADDRESS # 2, the second **VS-88HCB** unit to SELF ADDRESS # 3, and so on - up to SELF ADDRESS # 8 for the seventh **VS-88HCB** unit (see section 6.5.1).
3. Terminate the RS-485 line on both the **RC-3000**[2] and on the last **VS-88HCB** unit (set DIP 4 to ON).
4. Connect the RS-485 ports on the **RC-3000** to the RS-485 ports on each of the **VS-88HCB** units, as follows:
   - Connect the "A" (+) PIN on the RS-485 rear panel port of the **RC-3000** to the "A" (+) PIN on the RS-485 rear panel ports of the **VS-88HCB** units
   - Connect the "B" (-) PIN on the RS-485 rear panel port of the **RC-3000** to the "B" (-) PIN on the RS-485 rear panel ports of the **VS-88HCB** units
   - If shielded twisted pair cable is used, the shield may be connected to the "G" (Ground) PIN on one of the units (for example, on the **RC-3000**)

1 Switch OFF the power on each device before connecting it to your VS-88HCB. After connecting your VS-88HCB, switch on its power and then switch on the power on each device

2 Refer to the RC-3000 user manual for details of how to terminate the RS-485 line

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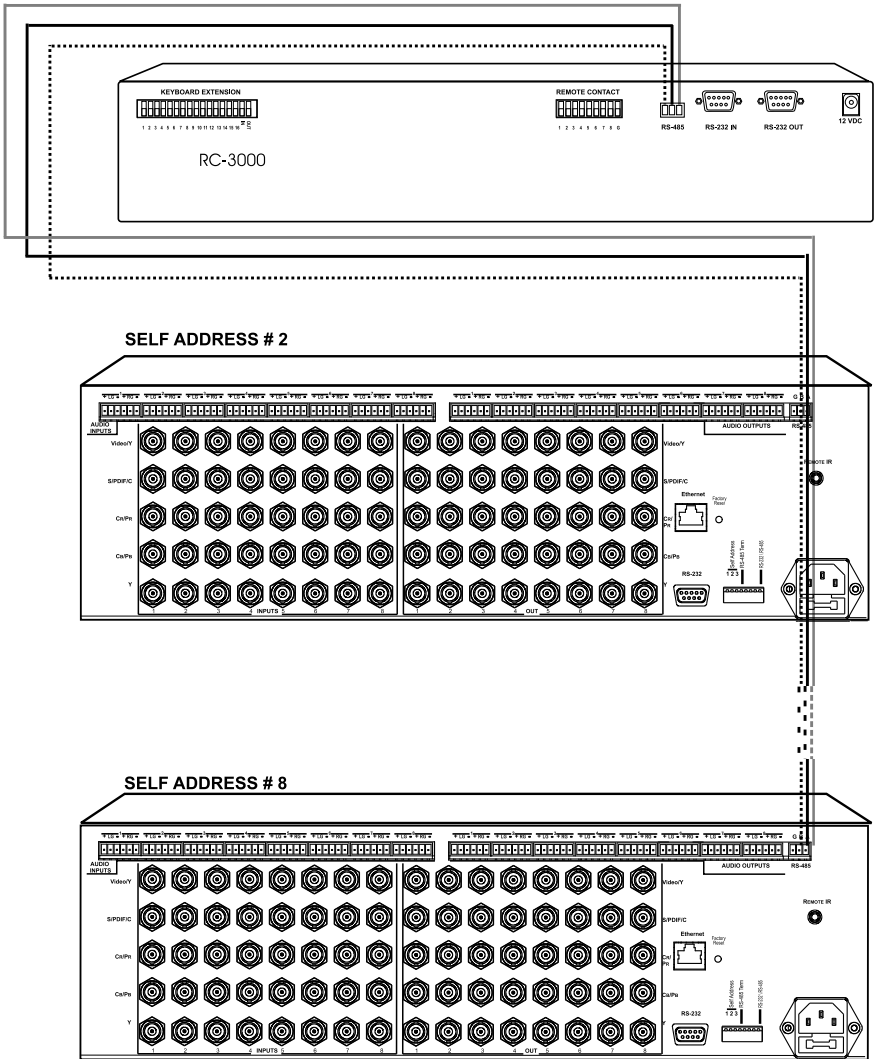

Figure 13: Control Configuration via RS-485

8.3 Control Configuration via the ETHERNET Port

To control several units via the ETHERNET, connect the Master unit (SELF ADDRESS # 1) via the ETHERNET port to the LAN port of your PC. Using your PC, initially configure the settings as described in section 6.4.3.

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9 Technical Specifications

Table 5 includes the technical specifications:

Table 5: Technical Specifications[1] of the VS-88HCB

INPUTS:	5x8 composite video 1Vpp/75Ω and S/PDIF digital audio or s-Video 1Vpp/75Ω (Y), 0.3Vpp/75Ω (C); and component video 1Vpp/0.7Vpp/75Ω on BNC connectors 8 balanced stereo audio, +4dBm/33kΩ, on detachable terminal blocks	
OUTPUTS:	5x8 composite video 1Vpp/75Ω and S/PDIF digital audio or s-Video 1Vpp/75Ω (Y), 0.3Vpp/75Ω (C); and component video 1Vpp/0.7Vpp/75Ω on BNC connectors 8 balanced stereo audio, +4dBm/150Ω, on detachable terminal blocks	
MAX. OUTPUT LEVEL:	VIDEO: 2.8Vpp	AUDIO: 24Vpp
BANDWIDTH (-3dB):	VIDEO: 300MHz, Fully Loaded	AUDIO: 100kHz
S/N RATIO:	VIDEO: 74dB	AUDIO: 84dB unweighted, (1Vpp)
CROSSTALK (all hostile):	VIDEO: <–50dB @5MHz	
CONTROLS:	Manual, RS-232, RS-485 and ETHERNET	
AUDIO THD:	0.025% (1V, 1kHz)	
POWER SOURCE:	100 - 240V AC, 50/60Hz, 23VA	
DIMENSIONS:	19" x 7" x 3U	
WEIGHT:	5.5kg (12.2lbs) approx.	
ACCESSORIES:	Power cord, Windows®-based Ethernet Configuration Manager and Virtual Serial Port Manager, Windows®-based Kramer control software, Null-modem adapter	
OPTIONS:	External remote IR receiver cable[2]	

1 Specifications are subject to change without notice

2 P/N: C-A35M/IRR-50

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10 Table of Hex Codes for the Master VS-88HCB

Table 6 shows the "HEX" codes for switching the master **VS-88HCB**.

Table 6: Hex Codes for Switching the Master VS-88HCB

OUT	1	2	3	4	5	6	7	8
IN 1	01	01	01	01	01	01	01	01
	81	81	81	81	81	81	81	81
	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81
IN 2	01	01	01	01	01	01	01	01
	82	82	82	82	82	82	82	82
	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81
IN 3	01	01	01	01	01	01	01	01
	83	83	83	83	83	83	83	83
	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81
IN 4	01	01	01	01	01	01	01	01
	84	84	84	84	84	84	84	84
	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81
IN 5	01	01	01	01	01	01	01	01
	85	85	85	85	85	85	85	85
	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81
IN 6	01	01	01	01	01	01	01	01
	86	86	86	86	86	86	86	86
	81	82	83	84	81	82	83	84
	81	81	81	81	81	81	81	81
IN 7	01	01	01	01	01	01	01	01
	87	87	87	87	87	87	87	87
	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81
IN 8	01	01	01	01	01	01	01	01
	88	88	88	88	88	88	88	88
	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81

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11 Communication Protocol 2000[1]

The **VS-88HCB** is compatible with Kramer's Protocol 2000. Communication with the **VS-88HCB** uses four bytes of information as defined below. Data is transferred at 9600 baud with no parity, 8 data bits and 1 stop bit.

Table 7: Protocol Definitions

MSB							LSB
	DESTINATION	**INSTRUCTION**					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0
1st byte							
				INPUT			
1	0	0	0	I3			
7	6	5	4	3			
2nd byte							
				OUTPUT			
1	0	0	0	O3			
7	6	5	4	3			
3rd byte							
				MACHINE NUMBER			
1	0	0	0	0	M2	M1	
7	6	5	4	3	2	1	
4th byte							

1st BYTE: Bit 7 – Defined as "0", D – "DESTINATION BIT"
This bit is always "low", when sending from the PC to the Matrix Switchers, and "high" for information sent to the PC.
N5…N0 – "INSTRUCTION".
The function that is to be performed by the Matrix Switcher (s) is defined by these 6 bits. Similarly, if a function is performed via the machine's keyboard, then these bits are set with the **INSTRUCTION #** which was performed. The instruction codes are defined according to the table below (**INSTRUCTION #** is the value to be set for N5…N0).

2nd BYTE: Bit 7 – Defined as "1".
Bits 4 – 6 - Defined as "0".
I3… I0 – "INPUT".
When switching via RS-232 for RS- 485 (for instruction codes 1 and 2), these bits set the input that is to be switched. Similarly, if switching is done via the machine's keyboard, then these bits are set with the input number which was switched. For disconnect, set as 0. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 - Defined as "1".
Bits 4-6 Defined as "0".
O3 – O0 – "OUTPUT".
When switching via RS-232 or RS-485 (for instruction codes 1 and 2), the output to switch is set by these bits. Similarly, if switching is done via the machine's keyboard, then these bits are set with the output number that was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as "1".
Bits 3-6 Defined as "0".
M2… M0 – "Machine Number".
Machine Number = (DIP – Switch Code) + 1.

1 You can download our user-friendly "Software for Calculating Hex Codes for Protocol 2000" from the technical support section on our Web site at: http://www.kramerelectronics.com

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INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET MACHINE	0	0	1
1	SWITCH VIDEO	Set equal to video input to be switched	Set equal to video output to be switched (0=to all the outputs)	2
2	SWITCH AUDIO	Set equal to audio input to be switched	Set equal to audio output to be switched (0=to all the outputs)	2
3	STORE STATUS	Set as SETUP #(1-8)	- To store parameters - to delete setup	2,7
4	RECALL STATUS	Set as SETUP #(1-8)	Don't care	2,7
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #(1-8)	Equal to output number whose status is read	3,7
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #(1-8)	Equal to output number whose status is read	3,7
7	VIS SETTING	Don't care	- for immediate switching - for VIS switching	2
8	BREAKAWAY SETTING	Don't care	- for audio-follow-video - for breakaway	2
9	NOT USED			
10	REQUEST VIS SETTING	Set as SETUP #(1-8)	Don't care	3,7
11	REQUEST BREAKAWAY SETTING	Set as SETUP #(1-8)	Don't care	3,7
12 to 14	NOT USED			
15	REQUEST WHETHER SETUP IS DEFINED	Set as SETUP #(1-8)	Don't care	4
16	ERROR/BUSY	Don't care	Don't care	5
17	RESERVED			6
18	RESET MACHINE	0	0	1
19	STORE STATUS	Set as SETUP #(1-8)	0-to store parameters 1-to delete setup	2,7,9
20	RECALL STATUS	Set as SETUP #(1-8)	Don't care	2,7,10
21 to 56	NOT USED			
57	SET AUTO-SAVE	for auto save 0 – no save	Don't care	8,2
58 to 60	RESERVED			
61	IDENTIFY MACHINE	1or 2 – machine name 3 or 4 – version	Don't care	11

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it performs the instruction, and if the instruction is performed (due to a keystroke on the front panel), then these codes are sent. For example:

0000 0001
1000 0101
1000 1000
0011

was sent from the PC, then the switcher (machine#3) will switch input 5 to output 8. If the user switched input#1 to output#7 via the front panel keypad, then the switcher will send:

0100 0001
1000 0001
1000 0111
1000 0011 ⇒ to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it sent (except for the first byte, where the DESTINATION bit is set "high").

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NOTE 3 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number#5 is breakaway setting, then the reply to

0000 1011		0100 1100
1000 0001	Would be ⇒	1000 0001
1000 0000		1000 0001
1000 0101		1000 0101

NOTE 4 - The reply to the "REQUEST WHETHER SETUP IS DEFINED" is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined; or 1 if it is defined.

NOTE 5 - An error code is returned to the PC if an invalid code was sent to the switcher (e.g. trying to save to a setup greater than 8, or trying to switch an input or output greater than the highest one defined). This code is also returned to the PC if an RS-232 instruction is sent while the machine is being programmed via the front panel. Reception of this code by the switcher is not valid.

NOTE 6 - This code is reserved for internal use.

NOTE 7 - SETUP #0 is the present setting. SETUP #1 to SETU P#8 are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 8 - Under normal conditions, the machine's present status is saved each time a change is made. The "power-down" save (auto-save) may be disabled using this code. Note that whenever the machine is turned on, auto-save function is set.

NOTE 9 - This is identical to instruction 3 (machine uses instruction 3, when sending to PC).

NOTE 10 - This is identical to instruction 4 (machine uses instruction 4, when sending to PC).

NOTE 11 - This is a request to identify the switcher/s in the system. If the INPUT is set as 1 or 2, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, the reply to the request to send machine name (for machine number 001) would be:

0111 1101	
1000 1000	(i.e. 128 + 8)
1000 1000	(i.e. 128 + 8)
1000 0001	

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it.
For example, for version 3.5, the reply would be:

0111 1101	
1000 0011	(i.e. 128 + 3)
1000 0101	(i.e. 128 + 5)
1000 0001	

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im Vertrieb von CAMBOARD Electronics

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

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For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

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